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# West Europe Report

SCIENCE AND TECHNOLOGY

No. 139

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14 March 1983

## WEST EUROPE REPORT SCIENCE AND TECHNOLOGY

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### CONTENTS

#### BIOTECHNOLOGY

- Genetic Engineering Institute Established in Berlin  
(EUROPA CHEMIE, 8 Oct 82) ..... 1
- Briefs
- Netherlands Biotechnology Program ..... 2

#### CHEMICALS

- Chemicals Industry To Divide Activities Between ENI, Montedison  
(AFP SCIENCES, 6 Jan 83) ..... 3

#### ELECTRONICS

- Thomson-Grundig Consumer Electronics Team To Fight Japan  
(LE MONDE, 7 Feb 83) ..... 5
- Thomson-Brandt-Grundig Association,  
by Philippe Lemaitre  
Cartel Authority's Position
- Siemens Reports on Current Chip Technology  
(VID NACHRICHTEN, 15 Oct 82) ..... 9

#### ENERGY

- French Government Encourages Coal Conversion Projects  
(SEMAINE DE L'ENERGIE, 18 Jan 83) ..... 11
- Briefs
- Netherlands Coal Gasification ..... 13

## INDUSTRIAL TECHNOLOGY

Danish Composite-Materials Research, Development (BERLINGSKE TIDENDE, 30 Dec 82) .....	14
---	----

## SCIENCE POLICY

Netherlands: Science Policy, S & T Budget for 1983 (AFP SCIENCES, 6 Jan 83) .....	16
--	----

## TRANSPORTATION

Kulka Robots Accurate, Sturdy, Better Than Japanese (Peter Schmalz; DIE WELT, 18 Jan 83) .....	18
Aerospace Industries in Hard Times, Says Aerospatiale Head (LE MONDE, 14 Jan 83) .....	21
SNIAS Develops Second-Generation CNC Laser Cutter (Patrick Piernaz; L'USINE NOUVELLE, 27 Jan 83) .....	23
Peugeot Model 205 Introduced in January (AUTO-INDUSTRIES, 21 Jan 83) .....	25
Fiat Introduces New Model Called 'Uno' (AUTO-INDUSTRIES, 20 Jan 83) .....	27
Comments on, Comparison of Fiat 'Uno', Peugeot '205' (AUTO-INDUSTRIES, 24 Jan 83) .....	29
Peugeot, Renault Continue Development of Cars of Future (L'ARGUS DE L'AUTOMOBILE, 7 Oct 82) .....	31
French Authorities Disagree on Future of A 320 (LE MONDE, 29 Jan 83) .....	35
British Leyland Reveals 'Energy Conservation Vehicle' (Daniel Coue, Pierre Laperrousaz; L'USINE NOUVELLE, 6 Jan 83) .....	37
British Robots 'Sniff' for Leaks in Auto Bodies (Sven-Olof Carlsson; NY TEKNIK, 30 Sep 82) .....	39
Renault, VW To Jointly Manufacture Automatic Transmissions (AUTO-INDUSTRIES, 13 Jan 83) .....	41
Daimler Benz 'Auto 2000' Is Touring Car (Olaf von Fersen; VDI NACHRICHTEN, 15 Oct 82) .....	43

## BIOTECHNOLOGY

### GENETIC ENGINEERING INSTITUTE ESTABLISHED IN BERLIN

Duesseldorf EUROPA CHEMIE in German 8 Oct 83 p 479

[Text] A cooperative venture between Schering AG and the State of Berlin, which has as its goal the establishment of an institute of genetic engineering, must be viewed as an important step for biotechnological research in Germany. For the next 10 years plans call for expenditures amounting to DM80 million; these are to be provided equally by Schering and the State of Berlin. The cost of the building and initial outfitting are estimated at DM20 million, the running costs at DM6 million per year. Naturally the House of Deputies must agree to Berlin's share. In addition, an effort is to be made to attract outside funding especially from supraregional organizations involved in research support. The institute will be primarily engaged in basic research in the area of cell biology. In order to catch up as quickly as possible with the international level, the institute will also train qualified junior workers for science and industry. The director, who is yet to be named, is to make a substantial impact on the work, at the same time is to function as an advanced school instructor and represent the institute with its approximately 30 staff members.

In order to guarantee minimal breadth in the research, there is provision for departments of microbiology, biochemistry and molecular genetics. The institute will be operated as a limited liability company. It is to operate autonomously and independently; it is to be the source of ideas for basic research at advanced schools and other research facilities.

An option on the results developed in the institute is to be granted to Schering as a founding member. If it is exercised, then the customary compensation is to be paid. The part of the total financing which Schering is responsible for corresponds to about one-third of the total outlays which the company will provide during the same period in the area of product and method-oriented research and development in genetic engineering. There is a long tradition of biotechnology at Schering since steroid hormones have been produced by fermentation on an industrial scale. Since 1979 Schering has been testing the possible application of genetic engineering to the production of various low-molecular substances. The aim of a specific program is the development of special methods to produce proteohormones and amino acids. In the latter area it was possible to conclude the first phase of basic research, successfully.

12124

CSO: 3698/166

## BIOTECHNOLOGY

### BRIEFS

NETHERLANDS BIOTECHNOLOGY PROGRAM--The Netherlands will spend 30 million dollars over the next 7 years on its biotechnology innovation program. The main areas of basic and applied research involved are: agriculture; dairy industries; fermentation industries; production of antibiotics. More or less long-term projects are planned for: the development of "host-vector" systems; cellular hybridization; bioreactors for the production of enzymes. A committee under the presidency of Pr R A Schilperoort, expert in genetic engineering research at the University of Leiden, will coordinate research efforts between government institutes, universities, and industry. The "Committee on Biotechnology" is the result of a cooperation between representatives from the Ministry of Economics Affairs, and the Ministry of Science and Education [as published]. [Text] [Puteaux BIOFUTUR in French Sep 82 p 14] 12204

CSO: 3698/140

## CHEMICALS

### CHEMICALS INDUSTRY TO DIVIDE ACTIVITIES BETWEEN ENI, MONTEDISON

Paris AFP SCIENCES in French 6 Jan 83 p 6

[Article: "'Historic' Agreement for Italian Chemical Industry"]

[Text] The final agreement on the partition of activities between the two major poles of the Italian chemical industry--one of which is state-owned and dominated by the oil group ENI (National Hydrocarbons Agency), while the other is private and dominated by Montedison, which ranks seventh in the world--was signed on 31 December.

The agreement had been contemplated for two years; it materializes the understanding arrived at by the two groups on 22 December and approved by the Italian government the next day. It was signed in Rome by the presidents of the two groups, Messrs Mario Shinberni (Montedison) and Umberto Colombo (ENI).

The "chemical peace" between the two Italian groups is thus ensured; from now on, each will devote its efforts to consolidating its position in the sectors falling within the scope of its activities.

The activities of the Italian heavy chemical industry as a whole (petro-chemistry and plastics) will now be gathered around ENI which, in the past few years, had been forced by the Italian government to acquire minor chemical companies in difficulties (ANIC [National Agency for the Hydrogenation of Fuel], SIR [expansion unknown], Liquigaz, Liquichimica).

As for Montedison, it will devote itself to high-technology fine chemicals with a high added value.

By 1986, the two groups are expected to rank among European leaders, each in its own special field.

In actual practice, Montedison will sell its Brindisi petrochemical complex to ENI. A partition of activities will also take place between Montedison plants at Priolo and Gela (Sicily) and those at Porto Marghera (Venetia) and Ferrare (Emilia Romagna).

ENI will pay the private group a financial compensation of some 420 billion lire (approximately 14.7 billion dollars [as published]).

The government will take two months to make sure the agreement is complied with. The minister of state participations, Mr Gianni de Michelis, has already formally assured ENI that it would receive public financing amounting to some 500 billion lire (approximately 17.5 billion dollars [as published]).

ENOXY [expansion unknown] will be placed in charge of the state-owned chemical industry; this company became a fully-owned ENI subsidiary after the American group Occidental Petroleum withdrew itself on 17 December 1982.

9294

CSO: 3698/192

## ELECTRONICS

### THOMSON-GRUNDIG CONSUMER ELECTRONICS TEAM TO FIGHT JAPAN

#### Thomson-Brandt-Grundig Association

Paris LE MONDE in French 7 Feb 83 p 19

[Article by special correspondent Philippe Lemaitre: "Future of the European Electronics Market: Max Grundig's Message"]

[Text] The Thomson-Brandt-Grundig regrouping, in other words the creation of a second powerful consumer electronics pole in the Community, next to Philips, puts European industrial cooperation to the test. If it fails, it will be a disaster.

Furth--At Grundig's headquarters, in Bavaria, people are confident in spite of the many protests raised in the FRG against Thomson-Brandt's project to acquire 75 percent of Grundig's capital. The remaining 25 percent are now being held by Philips. Certainly, Mr Max Grundig, 74, the founder of the enterprise is grumbling against these politicians who, because of the forthcoming elections, are trying to "create a profile for themselves"; who, without knowing all the elements of the deal, claim that he, Grundig, is selling off German interests to the French industry; who say that Thomson-Brandt, as it is wont to do, will seize the first opportunity to close factories in the FRG in order to save or create jobs in France. "We have become a symbol of Germany," the man who is still at the head of the leading consumer electronics group in the FRG observes with some irritation. A determined man who uses a blend of seduction and authority in negotiations, Mr Grundig is by no means a big boss on the decline who would have been offered a good deal (Thomson is said to have offered a very high price) and would therefore wish to step down without making waves. He is a pugnacious man fully involved in his struggle to ensure the future of his enterprise; he is certain to be right and, we must say, quite convincing.

His arguments are as follows: it is not a choice between a German and a French solution; it is a choice between the preservation of a European electronics industry and playing second fiddle to the Japanese. Based on this, he applies himself to demonstrate that, apart from a few detail modifications, there is no alternative to the project he has designed together with Mr Alain Gomez, Thomson's chairman of the board and managing director.

People at Furth do not speak the solemn language of GATT diplomats. The boss does not pull his punches in describing, as he sees them, the intentions of those he calls "our competitors from the Far East." "They are using methods of programmed annihilation to dominate our market. Our workers have just as much right to work as Japanese workers." Facing such a challenge, we must unite to survive, increase series so as to reduce production costs. The Japanese are about to produce 14 million videotape recorders in 1983, close to 10 percent more than in 1982. That gives an idea of the order of magnitude involved. According to Mr Grundig, a European group must be able to produce 4 million color TVs and 2 million videotape recorders if it is to survive. Alone, an enterprise like Grundig cannot achieve this objective.

#### Choosing a Partner

The necessity for regrouping being thus described as obvious, there remains to choose a partner. Thomson-Brandt obviously does not have a good rating across the Rhine: it has already acquired SABA [expansion unknown], Nordmende, Dual; it has had to close factories and, to make things worse, it has also been nationalized. Understandably, some Germans rebel at the idea of seeing a large part of their industry managed from Paris and in the service of a strategy which many of them fear will be French rather than European. During our conversation, Mr Horst Klaus, one of the DGB [(West) German Labor Union Federation] delegates to the Grundig board of directors recognized--which is paradoxical for a union man--that he would prefer Philips to Thomson as a partner. Rather a multinational company than an enterprise remotely controlled by a socialist government whose behavior in managing the company, it is feared, may not be dictated only by rational economic considerations.

How could these fears be allayed? Mr Jaumann, the minister of economy of the land of Bavaria, was one of the most zealous advocate of a "German solution," or at least of a compromise according to which Siemens, Blaupunkt (a Bosch consumer electronics subsidiary), Philips and Thomson would unite their efforts. In that case, Thomson would make do with a little over 50 percent of the capital, and the Germans would have a blocking minority interest. Mr Grundig was against it. He allowed this maneuvering to take place, apparently with the certain knowledge that it could not succeed. In his opinion, no German solution is possible because, as far as electronics are concerned, there is not, or rather there is no longer any partner able to pull enough weight: Blaupunkt is too small and, besides, it also works with the Japanese; Telefunken is in distress... Nordmende and SABA belong to Thomson. For their part, Messrs Ludwig Poulain and Paul Baehr, Mr Grundig's head negotiators, observed that a group consisting of Philips, Siemens, Bosch-Blaupunkt and Thomson would be perfectly unmanageable.

#### Only One Solution

Q.E.D.: there is only one solution, Thomson. Thomson will bring money, which is still the sinews of war, a lot of industrial expertise, a market, and a young chairman of the board, Mr Gomez, whom Mr Grundig likes: "He would be quite qualified to sit on any of our board of directors in the FRG," he commented, with all the perfidy that such a compliment implies for the average French chairman of the board and managing director. When we talked with

Mr Klaus of the DGB, he admitted that he was puzzled by Mr Grundig's decisive argument: if the Grundig-Thomson operation does not succeed, then the French will have to throw themselves into the arms of the Japanese and the German industry will be doomed. We shall come back on this side of the question, on the forced limitations of Thomson's cooperation with the Japanese, a question which now lies in a grey area and is one of the unresolved key problems in our story.

Will Mr Grundig's message be heard? The first reaction to be watched was that of the Federal Cartel Authority (Kartellamt) which was to issue an opinion late in February: under German law, no regrouping can be authorized if it gives the resulting company a share of the market exceeding 50 percent. However, Mr Grundig and his staff were of the opinion that the wise men in Berlin (where the Kartellamt has its seat) would try to go beyond purely legal considerations and understand the European implications of the project. "German laws on competition are obsolete. We sorely need laws that will take into account all of the EEC territory. Our competitors from the Far East see Europe as a single market," Mr Grundig pointed out.

#### Apropos Videotape Recorders

There are signs that Mr Grundig's patient efforts are beginning to bear fruit: German political leaders are becoming more discreet, less aggressive. Certainly, Thomson will have to meet them halfway. In particular, through a more resolute industrial commitment at the side of its European partners. The problem arises in the case of videotape recorders. Quite simply: Grundig and Philips have designed a product, the Video 2000, which is perfectly competitive. Before being told by the government to look for a European partner, Thomson had been going in the direction of cooperation with the Japanese: it signed an agreement with them, under which it is to sell the VHS, one of the two Japanese videotape recorders on the market.

It appears that Thomson could get out of this agreement fairly quickly if it wanted to, and would be in a position to market the European Video 2000 within just a few months. Under the Thomson-Grundig agreement, as it stands now, Thomson could still assemble and sell the Japanese VHS; in that case, industrial integration between the European partners would take place progressively and, as far as video equipment is concerned, would be fully operative in two years from now, when second-generation 8-mm videotape recorders become available. Grundig and Philips as well, as coproducer of the Video 2000, would like Thomson to accelerate the process. The Brussels Commission also urges it to do so.

Is it not strange, even shocking--even if it is financially profitable--that, at a time when it is about to acquire Grundig, which has fully mastered the technology and manufactures an excellent product, the Video 2000, the French group exceeds its obligations and continues to privilege the Japanese product? This appears to be an internal problem at Thomson-Brandt: it looks as if some of the group's managers, regretting the Japanese option which the government has opposed, were reluctant to go ahead and make the necessary decisions to increase the chances of success of the operation. This is a problem which the French will have to solve among themselves.

## Cartel Authority's Position

Paris LE MONDE in French 7 Feb 83 p 19

[Article by J.-M. Q.: "Berlin Cartel Authority Reportedly Relaxing Its Position"]

[Text] After weeks of maneuvering around the projected acquisition of 74.5 percent of the German company Grundig by the French group Thomson-Brandt, the situation late in the week was said to have evolved. Contrary to rumors which were circulating last month, the West-Berlin Cartel Authority is said not to be a priori hostile to the protocol agreement submitted to it early in January. It could even issue a favorable opinion in the next few days, on condition that the Dutch group Philips get rid of the 24.5 percent interest it is holding in Grundig. This condition would be designed to prevent any possibility of an agreement between Philips, the European number one in consumer electronics, and the new Thomson-Grundig group, which would then be about equal to Philips. It is said that the Cartel Authority wishes to preserve real competition in Europe and on the German market between at least two major groups.

Should this position of the Cartel Office be verified, it will place the Dutch group on the spot. Its chairman of the board and managing director, Mr Dekker, publicly stated this week that he thought the Grundig-Thomson operation was "a good thing" for Europe; therefore, it is hard to see how Philips could take the responsibility of having the operation fail, all the more so as Philips's withdrawal from Grundig would not invalidate technical and commercial agreements already existing between the two companies. It would also not preclude the conclusion of joint research and development agreements with Thomson. Yet, there remains to know who would take over Philips's 24.5 percent--Thomson or German groups--and at what price?

9294

CSO: 3698/210

## ELECTRONICS

### SIEMENS REPORTS ON CURRENT CHIP TECHNOLOGY

Duesseldorf VID NACHRICHTEN in German 15 Oct 82 p 15

[Article by E. S.: "Short Conductor Paths Speed Access. Structures Almost Correspond to the Wavelength of the Light Source"]

[Text] Economic realization of future communication and information service will only be possible if not only individual circuits, but entire system parts, such as complete language recognition systems or television picture memories, are integrated on a silicon chip. Problems can occur with the fine structures which are required in such components. If a single alpha particle or a positively charged helium nucleus is released and if it migrates through the crystal, then it can produce just as many charge carriers as are stored as information in a cell. The desired information is then adulterated.

As Dr Hans Friedrich, director of the microelectronics section of the Siemens research laboratories in Munich-Perlach, explains, chip designers today are still about one magnitude removed from those 0.2- $\mu\text{m}$  structure dimensions which may mark the physical limits of advancing circuit miniaturization. With today's techniques of chip production alone (irradiation, etching and implanting), structures up to 0.5- $\mu\text{m}$  are achievable; just a few years ago such was scarcely held possible.

In the words of Dr Dietrich Widmann, director of the microstructure technology section at Siemens, the company has already been able to realize photo-doped circuit models of 0.5- $\mu\text{m}$  structural fineness which involved continued work with light optical procedures. And this is true although the irradiation wave length of 436-nm is only just a little bit smaller than the 500-nm of the structures. For the next few years we should not have to reckon with any kind of limitation on structural fineness since it is always possible to resort to X-rays for chip irradiation. In that case then, conductor path masks would have to be used which were traced by electron beams. This will make it possible to achieve structures down to 200-nm.

Alpha particles are a much discussed problem in connection with dynamic RAM; a single one of them on the way through the memory cell of a dynamic memory with a 2- $\mu\text{m}$  structures produces almost just as many charge carriers as are stored as information in the cell. Siems has developed polyimide dopes as a shield against this alpha radiation.

Future VLSI [very large scale integration] circuits might perhaps have several conductor path levels because, according to Widmann, just shifting to two polysilicon levels permits reducing the area of a memory cell by 40 percent. The VLSI expert explained that shorter access times and additional saving of space can also be achieved by shifting from polysilicon to metallic silicides.

While MOS [metaloxide semiconductor] circuits so far had the reputation of switching relatively slowly as compared with bipolar transistors, Siemens staff member Dr Hans-Joerg Pfleiderer, director of the circuit technology section, reported on a substantial gain in speed thanks to systematic structure reductions. Using a ring oscillator they succeeded in achieving delay times of 100 picoseconds (ps).

#### Cell Structure Repeated

For what are such fast circuits necessary? According to Pfleiderer, for example, for many future tasks from broadband communication and digital language processing, for which in the future no doubt frequently a chain of three different processors will be used. A preprocessor will pick out from the volume of information whatever is destined for the receiver, a signal processor which is coupled in will decode the signals, and a third, the data processor, finally will display it on the screen for the viewer or continue further processing.

The fastest component must be the preprocessor because it will have to cope with data rates of one billion bits per second. So that the costs of development remain within limits this semiconductor product will be built of individual identical processing cells which will be linked together like a conveyor belt. This has the primary advantage that only short connectors need be used from cell to cell; this makes it possible to bring the structures especially close together and thus to utilize the MOS advantage of lower power consumption. If there is a shift to extremely small structures, then the traditionally normal working voltage will have to be further reduced from 3 volts.

If precautions are not taken in their design, VLSI logic components can easily become extremely complex and perhaps even unrealizable. Thus, their design must be planned from the outset in such a way that they involve a modular design with regular structures. Such a design is the only practicable way to automate processor design.

12124

CSO: 3698/166

## ENERGY

### FRENCH GOVERNMENT ENCOURAGES COAL CONVERSION PROJECTS

Paris SEMAINE DE L'ENERGIE in French 18 Jan 83 pp 10-11

[Article: "AFME [French Agency for Energy Expertise] Aids to Coal Conversion"]

[Text] The development of coal conversion in the industry is one of the major orientations of the government's energy policy. The objective is to achieve a 15 Mt consumption by 1990, which means that oil and gas products equivalent to an average of 900,000 tons of oil per year would have to be replaced by coal.

In addition to its fiscal and financial provisions, the system of subsidies granted by the Agency is essentially intended to assist industrialists in making decisions, and in making them faster.

Are eligible all operations which, in a single facility or boiler-plant, represent a power of at least 600 kW or a savings of oil and gas products at least equal to the equivalent of 250 tons of oil per year, provided that no order is placed prior to the application for subsidy and provided that the enterprise is complying with official regulations concerning the rational use of energy.

Under these conditions, the subsidy granted by the Agency is equal to 25 percent of the additional cost of the operation, exclusive of taxes, with a ceiling of 250 francs per oil-ton equivalent in annual savings of oil and gas products. The additional cost includes boiler-plant equipment proper (boiler, burners, etc.), as well as peripheral equipment (control, regulation, effluent processing, feed system) and preparation, handling and storage facilities. It must be higher than, or equal to 500 francs per oil-ton equivalent in oil and gas products replaced by coal each year.

For operations deemed especially impelling (because they disseminate new technology or provide an example for a region or a sector, etc.), the subsidy could be increased to 40 percent of the operation's additional cost, with a maximum of 400 francs per oil-ton equivalent saved. To receive these additional subsidies, two conditions must be fulfilled:

- work must start within 6 months after the decision is made and, at any rate, before 30 March 1983;

- the industrialist must agree to open his facilities to visitors, publish his technical and economic results and take part in promotion campaigns.

Finally, to encourage enterprises to carry out preliminary studies on the use of coal, the Agency may in certain cases finance 50 percent of the cost of such surveys, up to a total of 250,000 francs, exclusive of taxes. The survey must be carried out by an organization which is neither the applicant nor the coal supplier, and the aid given may in some cases be deducted from the subsidy for subsequent investments.

These subsidies to investments making it possible to use coal were instituted in 1980; at the time, different procedures were used for the industry and for housing, but they have been unified. In the industry, the Agency has supported 40 coal conversion projects during the past two years. The 102 million francs in subsidies it granted to these projects resulted in 557 million francs in investments and the substitution of coal for oil and gas products equivalent to 579,000 tons of oil per year.

9294

CSO: 3698/197

## ENERGY

### BRIEFS

NETHERLANDS COAL GASIFICATION--Antwerp--The Netherlands minister of economic affairs has decided not to subsidize the coal gasification project that is to be done, for 120 million florins at Amsterdam by the Vegin D'Apeldoorn gas cooperative. The minister stipulated that the synthetic gas portion of the project was not large enough to constitute a significant step on the road to marketing the products of coal gasification in general and that this project was "uncertain" as to its contribution to satisfying the energy needs of the nation. Vegin has to decide now before the end of the year if it will follow up its project without the support of the government. [Text] [Paris CHIMIE ACTUALITES in French 8 Oct 82 p 12] 9969

CSO: 3698/167

## INDUSTRIAL TECHNOLOGY

### DANISH COMPOSITE-MATERIALS RESEARCH, DEVELOPMENT

Copenhagen BERLINGSKE TIDENDE in Danish 30 Dec 82 p 2

[Article: "New Danish Technology: Materials That Are Better And Cheaper Than Metals"]

[Excerpt] If Danish industry is to become more competitive and increase exports, it must replace metals with composite plastic materials. Research is underway at the Technological Institute and Danish products already have appeared on the market.

The Council on Technology stresses that the widespread use of composites in Danish industry would not only conserve resources, but also reduce metal and energy imports. The increased use of composites also would bolster exports, since more and more purchasers of components and finished products want to utilize the new light and wear-resistant materials instead of metals.

For some time the Department of Metallurgy at the Technological Institute has experimented to develop a composite material to replace asbestos gaskets in engines. The goal is to develop a material with the same properties as asbestos that can compete with asbestos in price. It must be heat-resistant and fracture-proof.

"We have constructed a prototype machine for producing the asbestos replacement, which consists of rockwool, cellulose fiber, clay, and latex. The latex gives the gasket elasticity. Despite good laboratory results, demands on the material are so numerous that it will be a long time before we can say for certain that the material can replace asbestos gaskets in internal combustion engines," said department head Jan Lemkow.

### New Fiber-Reinforced Concrete

The construction industry also is utilizing composite materials. Glass or plastic fibers are mixed with concrete. This results in lighter and more durable construction elements. At a housing complex owned by the housing coop Arbejdernes Boligselskab in Gladsaxe, 80 balconies are being renovated with light, fiber-reinforced concrete parapets by the engineering consulting firm Albaek & Nielsen. The parapets, which weigh 200 kg instead of the old ones weighing 1,000 kg, were developed by the housing coop, the Technological Institute, and Brandt Beton.

"We expect this system to be used widely here in Denmark where there are many balconies that must be renovated," said engineer Niels Thaulow of the Technological Institute. "Fiber-reinforced concrete uses inexpensive raw materials which primarily are Danish. It is inexpensive to shape, safe to process, and long-lasting."

The Council on Technology has provided financial support for development of the Danish fiber-reinforced concrete. Denmark has lagged behind in this area and if we were not in production now the domestic market soon would be inundated with finished goods made of fiber-reinforced concrete from abroad.

#### Technology Successful

"Now that there is little doubt that the new technology will be successful, Danish industry has a good opportunity to begin new production, increase exports, and prevent the import of fiber-reinforced concrete. Agri Contact and Perstrup Beton Industri already produce many fiber-reinforced concrete products, for example feed cribs, pig pens, and small containers at prices far below products made of other materials," Niels Thaulow said.

The Technological Institute offers assistance to industries that wish to convert to the new technology. Subsidies also can be obtained from the Council on Technology and the Development Fund. Two reports have been published on the topic: Plastbaserede Kompositmaterialer (Plastic-Based Composite Materials) from the Technological Institute and Kompositmaterialer (Composite Materials) with the subtitle Fremtidens konstruktionsmaterialer (Construction Materials of the Future) from the Council on Technology. Conferences on composite materials have been held recently at the Technological Institute, Tastrup, and the Jutland Institute of Technology.

9336

CSO: 3698/132

## SCIENCE POLICY

NETHERLANDS: SCIENCE POLICY, S & T BUDGET FOR 1983

Paris AFP SCIENCES in French 6 Jan 83 pp 2-3

[Article: "The Science Budget in the Netherlands in 1983"]

[Text] The Hague: The Dutch science budget will be 7.3 billion florins in 1983 (Fr 18.3 billion), announces SCIENCE POLICY, the government scientific information service publication, which recognizes that the increase of 300 million florins compared to 1982 does not amount to a real increase of research expenditures, since the percentage of the gross national product that will be devoted to it this year remains at 0.93 percent.

The recession, more than the absence of a minister of science in the new cabinet--Mr. W. Deetman, minister of education, is now taking care of scientific problems--seems to be responsible for this state of affairs.

In the government share, Fr 3.740 million will be divided between the universities and the polytechnical institutes, with the remaining Fr 5.268 million to fund other government research.

SCIENCE POLICY emphasizes that, while in other industrialized nations the government share in the research budget is higher than that of the Dutch government, "it is due primarily to their defense research. When the strictly civilian research expenditures are examined, the Netherlands are in second position, behind FRG, at least for the moment, since France and FRG have decided on a considerable increase in their civilian research expenditures in 1983.

SCIENCE POLICY goes on to say, "At the moment, a real increase in the Dutch research budget is not in sight. The funds available must be used as efficiently as possible. Efficiency is the key word. Starting now, projects will have to be extensively evaluated in terms of government policy: what the scientific budget means by 'coordinating policy and efficiency.'"

Scientific policy will show hardly any important changes in 1983. More detailed new research in the area of social sciences will, however, be undertaken, specifically on the 600,000 persons of ethnic minorities, working women, ergonomics, relationship to work, technological progress.

The reorganization of research structures now under way will be continued and a law instituting sectorial councils is expected in the spring to promote a better evaluation of research and of research needs in the sectors where Dutch science can make considerable progress.

SCIENCE POLICY cites a recent poll which shows that:

- a. Generally, Dutch research is insufficiently devoted to applications;
- b. The private contribution to research seems inadequate considering its size, whereas the government's contribution, on the contrary, is in most sectors;
- c. Research policy lacks a long term view in many areas;
- d. On the other hand, research in the Netherlands is well oriented from an international standpoint;
- e. Horizontal cooperative exchanges between scientists and users is often lacking and, finally,
- f. The existing infrastructures are insufficient.

Dutch research does not take enough interest in materials, in their technology and in manufacturing processes. It should promote a research program based on innovation in biotechnology, modernization of industry, facilitate research on lasers, microcomputers and its integration into numerous sectors (energy, data processing, marine research).

International cooperation, in the European framework or bilaterally with other nations, should remain one of the basis of the Dutch scientific policy in this recessionary period. However, the beneficial "fallout" of this cooperation should be evaluated better than it was in the past.

The Netherlands are, in fact, participating in the scientific programs of the European Economic Community (fusion, biomolecular research, telecommunications), of UNESCO (specifically in oceanography), the European Space Agency, CERN [European Nuclear Research Center], and the molecular biology laboratory, etc., depending on its financial means.

In the area of health, Dutch officials regret that there is no overall research plan and expect to remedy this situation during the coming years. In the area of oceanology, the Netherlands will continue specialized, long-term research on marine species, minerals and carbon hydrates, the protection of coastal waters and the coastal environment in general.

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CSO: 3698/167

## TRANSPORTATION

### KULKA ROBOTS ACCURATE, STURDY, BETTER THAN JAPANESE

Bonn DIE WELT in German 18 Jan 83 p 3

/Article by Peter Schmalz: "A Cast-Iron Worker Bee from Swabia Is Beating the Robots from the Far East"/

/Text/ It stands in a corner, turns and swivels, lifts its fluorescent orange arm, holds up the yellow object above it, keeps it there for the fraction of a second, and then bows to the ground, at the same time turning around its own axis. It is showing off its paces in a factory bay on the industrial estate of Friedberg in Swabia, but nobody pays any attention.

It has been ordered into the corner for 100 hours, 6,000 minutes without a break. IR 601/60 must prove for 360,000 seconds that it is able to smoothly move its six axles consonant with a complex program and accurate to a fraction of a millimeter. Only after this test period is it deemed good enough for permanent employment: IE 601/60 will later be employed in the Cologne Ford plant to more accurately spot-weld auto bodies than any assembly line worker and, up to now, any other rival. IR 601/60 is acknowledged the most precise and reliable industrial robot currently operating anywhere in the world.

The processing machine is 2 meter high and weighs more than 2 tons. It is the star among automated robots. "Our strength lies in precision," comments Stefan Mueller, robot sales director of the Augsburg firm :Kuka," a subsidiary of Industrie-Werke Karlsruhe Augsburg (IWKA), itself part of the Quandt group. Up to now the Swabians have been successful in their challenge to Japanese and U.S. competitors, becoming virtually indispensable on their particular market. Whether the car in question is a small Mercedes or the new BMW, whether Audi 100 or Ford Sierra, the body is always welded by the IR 601/60.

Board member Burkard Wollschlaeger pries the capacities of his monster machine, 300 of them in operation in the BMW works alone. He claims that "the Japanese are still unable to match it." Turnover proves that Swabian efforts are quite capable of instilling fear in the Japanese: In 1980 turnover amounted to a meager DM13.6 million, in the following year to DM36 million and within another year had doubled again to DM72 million. This year an already almost assured major order may lift the turnover above a billion. While trying to look modest, Wollschlaeger says something that sounds astounding in this time of recession: "Double digit growth rates are possible." The Swabian robot's strength exceeds the visible--at about a hundredth

millimeter. Each component, from the base to the iron fist, is repeatedly milled and gauged to that accuracy. Nowhere else, except in spaceship construction, is a superheavy monster being built at such a low threshold of tolerance.

Once a processing machine is assembled, it must rapidly hit to an accuracy of half a millimeter. The Swabians give a guarantee no competitor dares offer: Each of their robots differs from any other they produce by no more than 1.5 mm. This means that any defective machine at a welding line may be quickly replaced by a reserve robot; the assembly line is idled for a short time only. One experienced team in a plant intends to lower the time needed for the change-over to 15 minutes from the 60 minutes the manual mentions.

In December 3,500 robots operated in West German factories, 1,200 more than a year ago. "We may assume a similar rate of growth in 1983," comments diploma engineer Manfred Schweizer, Stuttgart Fraunhof Institute for Production Technology and Automation. Last year's surge was due directly to a half dozen of new automobile models that entered the market in recent months. The reason is the double affinity between robot factory and car manufacturers.

For one welding is among the most unhealthy and stressful operations. The replacement of men by the machine therefore met the trade unions' call for the improvement of working conditions. For the other robot specialist "Kuka," an old established manufacturer of welding lines, has long been a supplier of automobile plants. Re-equipment with flexible processing machines has the further advantage for car manufacturers that they will no longer be compelled to scrap the entire automated transfer line when changing models. It is quite easy to reprogram the robot; in fact it is able to process different models one after the other.

Despite the high rates of growth, the Federal Republic's deployment of robots still lags behind that of Japan and the United States, though no longer so badly as some figures try to make us believe (for example the alleged 100,000 industrial robots used in Japan). Actually this is a problem of definition. Manfred Schweizer (Fraunhof Institute): "Nowadays industrial robots are internationally defined as universally employable automatic machines with several axles; their movements are generally realized by one or more arms; their extremities may be equipped with several articulated links." Japan, on the other hand, includes in the count simple automated insertion machines that cannot be programmed. At the end of December 12,000 industrial robots operated in Japan. The United States and Europe each have 9,600 such machines in operation. The Japanese are continuing their advance and are able steadily to widen their scientific lead. Even years ago, when German robot development was subsidized by a meager DM20 million, Japan encouraged the new technology with DM3.6 billion.

Wollschlaeger knows that he and his team must make strenuous efforts to withstand the pressure from the Far East: The great robot breakthrough is imminent. While hitherto the cast iron worker bees have been almost exclusively employed for welding, coating and painting, assembly robots are knocking on the door. Only 8 of the 170 machines offered in the FRG are suitable for assembly operations. By the mid-1980's this situation is to change fundamentally. The tremendous progress of sensor devices has done so much to obviate the foremost obstacle--the machine's cognitive disability--that a factory totally devoid of human labor is already reckoned to be technically feasible.

In Augsburg an IR 601/60, equipped with several sensors, is now training for its future field of operations: It picks up car wheels and screws them to the car. Not only are the screw bolts put accurately in place, the arm adjusts to the movement of the car passing by on the assembly line. The first machine is to be installed later this year. Already sales folders display the wonders prepared by the Augsburg firm's development department for car manufacturers. The robot picks up doors carried toward it automatically and screws them in; it bolts down oil pans and fits the flywheel to the engine; it sets and cements the windshield. The auto firms consider this an opportunity for safeguarding their competitiveness in the face of Japanese competition: 40 percent of auto plant personnel are employed on assembly.

This is precisely the reason why the labor unions are issuing warnings about the effects of the new robots. Gustav Feith, project group "humanization of the working world" established in Frankfurt/Main by the IG /industrial labor union/ Metal, says "the ideal end product of this development is the completely automated factory." The unions are therefore still divided in their attitude to the robots. On the one hand they see them as an opportunity to get rid of tiresome and unhealthy work, on the other they fear the loss of jobs implicit in widespread robot use. Current calculations estimate that one robot replaces up to four workers.

Producer Wollschlaeger also recognizes this problem. Talking to DIE WELT, he said that "this is a sociopolitical issue needing to be settled. I am rather aghast that the politicians seem to have nothing better to do than fight among themselves without really tackling the problem." Still, despite all question marks and problems, robots are on the march. At the present time only every eighth industrial robot operates in a factory with less than 500 workers, but more and more medium and small firms are getting interested. "Willingness and knowledgeability are greater," diploma economist Lieselotte Hinz, Dortmund Society for the Humanization of Work, states in a broad based study. The first results of her study are to be published in a few weeks' time.

Robots are coming, nobody may doubt that. Only the future will show whether they will make work more pleasant or abolish it altogether. They are often accused of being job killers, but in fact have really killed only once: The heavy arm of one slew a worker. That happened in Japan.

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## TRANSPORTATION

### AEROSPACE INDUSTRIES IN HARD TIMES, SAYS AEROSPATIALE HEAD

Paris LE MONDE in French 14 Jan 83 p 17

[Article by J.-F. A.: "Aeronautical and Space Industries Facing Possible 'Difficult Straits' in 1983 and 1984"]

[Text] "The road ahead of us is a narrow one. We must not, however, veer toward 'catastrophism.'" Speaking on Wednesday 12 January, for the GIFAS [French Aeronautical and Space Industries Group], Gen Jacques Mitterrand, president of SNIAS [also known as AEROSPATIALE] [National Industrial Aerospace Company], tried to sound reassuring as he opened.

In the figures he presented on the activity as a whole of some 160 firms in this sector, he found no "major concern" and pointed out that the consolidated annual turnover for the sector came to around 50 billion francs<sup>(1)</sup> for the year just ended, versus 44 billion francs in 1981. Something on the order of 30 percent of last year's total represents export shipments. New orders totaled 58 billion francs--44.5 billion of which are export orders--versus 52 billion francs in 1981. During the same period, however, domestic orders fell from 17 billion francs to 14.5 billion. As for employment in the sector, it rose slightly from 114,000 to 116,000 persons.

These figures, however, must not be allowed to obscure the fact that the aeronautical and space industries, like SNIAS itself (LE MONDE 8 December 1982), are facing "difficult straits" during the years 1983 and 1984.

Gen Jacques Mitterrand feels that, to get past this stretch of doldrums, the duration of which is anybody's guess--possibly 18 months or 2 years--but which the industries "should be able to weather," the government and the shareholders of enterprises are going to have to give a quick shot in the arm to European cooperation, launch new programs and resolve the technical problems inherent in "procedures for easing the financing of sales." This means looking into the acceptable duration of credits, the interest rates that can be offered, and even the advantages of lease-purchase contracts, which Douglas and Boeing are putting to such good use across the Atlantic with certain airline companies.

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(1) These figures are only estimates; the exact balance sheet of activities in this sector will not be completed for several weeks yet.

"It is obvious," adds the minister of transportation, "that the French Government, commensurately with its responsibilities and in liaison with its European partners, is following the evolution of this situation on an ongoing basis."

The minister of state concludes: "I deeply deplore an 'operation' the intent of which I do not know with respect to the outcome of the forthcoming elections, but the effect of which I am certain will not displease competing firms."

#### A-320: Two Serious Problems

As regards the future Airbus A-320, "We are prepared to do what is necessary to ensure that this plane will be built within short delivery times," the minister of transportation affirmed on Wednesday 26 January. Mr Fiterman then added that the financing of the undertaking poses "no difficult problem." Here again, it should be noted, the minister's optimism contradicts the concerns set forth by the president and general manager of SNIAS.

Gen Jacques Mitterrand, in fact, indicates in one of the annexes to his letter of 14 January that "If (...) several representative airline companies order a significant number of planes, the decision to launch the plane could take place the second half of this year, an initial flight in the spring of 1987, and its entry into service in the spring of 1988." Then he adds, "Between now and then, a certain number of problems must be resolved, the two most important ones being the division of the work and the participation of the partner governments in the financing of the plane's development and industrialization, the cost of which, it is estimated today, will come to \$1.85 billion under the economic and monetary conditions of January 1982."

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## TRANSPORTATION

### SNIAS DEVELOPS SECOND-GENERATION CNC LASER CUTTER

Paris L'USINE NOUVELLE in French 27 Jan 83 p 82

[Article by Patrick Piernaz: "Laser Machining: A Second-Generation Machine for SNIAS"]

[Text] A 1,200-W laser, a computerized direct numerical control and a host of technical improvements: these are the solutions adopted by SNIAS [National Industrial Aerospace Co. (Aerospatiale)] in Marignane to ensure high-productivity cutting. An original approach: experience acquired with a first machine was used to design this unique equipment.

"With a single machine working in 2 x 9, we were at the mercy of a breakdown and could not carry out development studies for new parts," Maurice Lanne, engineer in the special machines installation department, explained.

The machine is considered of strategic importance since it is indispensable to manufacture rotor hubs for the Ecureuil and Dauphin helicopters (Starflex stars). These parts are laser-cut from resin-impregnated glass cloth which is normally stored at -18°C. "When a bolt of cloth is taken out of storage, it must be used within the next six hours, but it takes four and a half hours to manufacture a star. We cannot afford any lengthy breakdown. From now on, if the machine breaks down, we can shift production to the second set of equipment."

This application of laser machining is not new. On the other hand, the Marignane setup is quite remarkable, as the intention of SNIAS engineers was to design a second-generation machine based on the knowhow acquired with the first machine. All those who are contemplating the purchase of a laser may therefore profit by their experience.

#### Cutting At 40 m/min With Laser

There are appreciable differences between the two sets of equipment. First, in the laser. "We have increased its power, which directly conditions the cutting speed. The CO<sub>2</sub> 1,200-W CILAS[Laser Industrial Company]-CBL[expansion unknown] laser can cut at 40 m/min, compared with 8 m/min with the former 350-W model. However, these are only peak speeds," Maurice Lanne told us quite

frankly. "We use speeds of 25 m/min all the time to cut in a straight line or in a circle (with a radius of 20 cm), but the speed measured in actual practice when cutting a star perimeter is 15 m/min."

To make the most of the laser power, the specifications supplied to the project prime contractor, COMSIP [expansion unknown], and to the machine manufacturer, Duffieux, imposed a maximum weight of 40 kg for the cutting beam.

The other mechanical alterations are also direct results of the maintenance department's concerns. In particular, the change in motor layout: it now pulls the . It instead of pushing it. "This is to ensure that the cloth is perfectly flat and that the beam is correctly focussed on the cloth," Remi Bonnefous, in charge of special machines maintenance, explained. "In addition, the new laser has a focal length of 125 mm, compared with 50 mm on the first system, so that focus settings do not have to be as sharp."

The last point emphasized by SNIAS technicians: the type of mirrors, since they are polluted by resin-combustion fumes. "We tried everything. Molybdenum gives the best results and, above all, it is easier to maintain and to clean."

A second strong point of the machine: its computerized direct numerical control (DNC). The system includes a Solar 16-40 computer, two Num-460 computerized numerical controls, a TS-X-80 controller and two 5-megabyte hard disks. All this explains why the system cost 4 million francs, including spare parts. Why such a heavy system to pilot a single machine? To gain time on program implementation, according to Jean-Francois Coustoulin who helped develop the system which was then realized by Num SA. Actually, cutting Starflex stars does require quite a lengthy program since a hub consists of 200-300 parts with different geometries and orientations. "A star requires a total of 1,600 blocks, and you need about 1 megabyte for each 3 stars," Jean-Francois Coustoulin indicated. "The computerized numerical control memories are filled automatically by the computer, which simplifies program entry problems; also, positions do not have to be computed again every time, which used to require up to eight minutes per part on the first machine."

#### How To Reconcile High-Speed and Precision

For the numerical control, SNIAS has used two computerized numerical controls so the machine can work simultaneously along five axes (two for cutting and three for the manipulator robot); it had to modify the resolution precision (1/100 mm instead of 1/1000) in order to improve the maximum working speed, which was then increased from 12 to 120 m/min. While a dual computerized numerical control can now be replaced by a new-generation multiprocessor computerized numerical control, this realization points to a problem which is getting more acute as laser applications are developed: is it possible to reconcile high speed and precision? All laser-machine manufacturers complain that no suitable numerical controls are available on the market. The answer of computerized numerical-control manufacturers should be known before the forthcoming Paris Machine-Tools Show, in June 1983.

## TRANSPORTATION

### PEUGEOT MODEL 205 INTRODUCED IN JANUARY

Paris AUTO-INDUSTRIES in French 21 Jan 83 pp 1-2

[Article: "An Event in the Automobile Industry: The Peugeot '205'"]

[Text] Paris 20 January (French News Agency)--On 24 January, a new Peugeot will be introduced in France: the "205" will take its place between the "104" and the "305."

The price of the new car will be around 38,000 francs for basic models and 50,000 francs for top-of-the-line models.

Peugeot spent 1.2 billion francs on the development and production tools for this new model (to be manufactured in Mulhouse) on which the company has pinned its hopes for recovery.

With a length of 3.70 m, a dipped hood, a large expanse of glass, etc., the "205" will occupy the place left vacant just above the "104" by the late "204" which was a resounding success from 1965 to 1976 (1,604,000 units were manufactured).

The new Peugeot stands midway between the Renault "5" and the "Golf"; it has a front-wheel drive with a four-cylinder transversal engine and four independent wheels.

In designing it, Peugeot used the experience acquired with the "Vera" research vehicle, especially with respect to aerodynamics (CX 0.35) and the rear-axle assembly.

The car comes in seven versions with five finish levels, and four engines:

- 954 cc, 45 ch DIN, 4 CV, 4 gears;
- 1,124 cc, 50 ch DIN, 4 CV, 4 gears, 142 km/h, 5.3 liters/100 km on the average;
- 1,360 cc (new engine), 60 ch DIN, 5 CV, 5 gears, 154 km/h, 5.9 liter/100 km on the average;

- GT 1,360 cc, 80 ch DIN, 7 CV, 5 gears, 170 km/h.

All these engines have overhead camshafts, light-alloy cylinder blocks and heads, transistorized ignition.

According to Peugeot, special care was given to soundproofing.

The two-tone instrument panel with a cloth covering includes storage areas and surfaces. Depending on the model, the rear seat can fold over in part or in half. The heating-ventilation system is especially efficient and the "205" comes with a six-year anticorrosion warranty.

The 50-liter gas tank has been placed in front of the rear-axle, in a protected area, and a single key controls all locks in the vehicle.

Finally, the car comes in 13 body colors, including 7 with a metallic finish, and 3 matching interior tones.

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## TRANSPORTATION

### FIAT INTRODUCES NEW MODEL CALLED 'UNO'

Paris AUTO-INDUSTRIES in French 20 Jan 83 pp 1-2

[Article: "The 'Uno,' a New Fiat With a Large Prospective Market"]

[Text] Paris, 19 January (French News Agency)--On 20 January, Fiat-France announced that a new Fiat model had been introduced in Italy: the "Uno," a front-wheel drive car with a "dual-volume" body, belongs to the category of "small average-size" cars.

It is 3.65 m long, i.e. mid-way between the "Panda" (3.05 m) and the "Ritmo" (3.94 m), and is probably designed to replace the "127" (3.71 m); on the market, the "Uno" should place itself in the immediate vicinity of the Peugeot "205," the Opel "Corsa" and the Volkswagen "Polo," in a category which accounts for 20 percent of all European new car sales.

According to Fiat, the strong points of the "Uno" will be:

- Its fuel efficiency: 4.3 liters per 100 km at 90 km/h in the case of the "es" model; this is achieved especially through a very elongated aerodynamic profile (lift coefficient: 0.34).
- Its "dual volume" body (no trunk) with room for five, three or five doors; it was designed by Giugiaro.
- A choice of three engines: 900 cc, 45 ch DIN; 1,100 CC, 55 ch; 1,300 cc, 70 ch; and a transmission with 4 or 5 gear ratios.
- Its suspension with four independent wheels.
- A maximum speed of 140-165 km/h.
- A weight of 700-750 kg.

The "Uno" will be manufactured at Mirafiori and Rivalta, near Turin, at the rate of 450,000 or so units per year, an output never reached by Fiat until now.

The "Uno" will be available in Italy starting on 21 January, and it will be sold in other countries in the spring of 1983.

For this new model, Fiat made the largest industrial investment of the past few years: it spent 1,000 billion lire (5 billion francs) on equipment that can also be used to manufacture other models. With advances in automation, data-processing and robotics (especially to assemble and weld the car body), it takes one-third less time to manufacture the "Uno" than it takes to manufacture a "127."

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## TRANSPORTATION

### COMMENTS ON, COMPARISON OF FIAT 'UNO', PEUGEOT '205'

Paris AUTO-INDUSTRIES in French 24 Jan 83 pp 1-2

[Article: "Fiat and Peugeot: Conquest and Reconquest"]

[Text] Paris, 21 January (French News Agency)--The Fiat "Uno" and the Peugeot "205": two new and very similar models which, for both manufacturers, will be conquest or reconquest vehicles.

The "Uno" and the "205" are going to make waves in a large segment of the European market which is chockfull of aging or recent models which all have serious drawbacks. The Peugeot, which is half a notch above the Fiat, will play on two segments of the market: the upper "small-car" range and the lower "medium-car" range. It can thus aspire to reach a sector representing 60 percent of the French market and 45-50 percent of the European market.

The "205" and the "Uno" appear to be providential conquest models. With a certain Latin exaggeration, Fiat heralds the "Uno" as the magnificent fruit of its social and industrial recovery. Indeed, Fiat plants are once again at peace with labor and have therefore returned to satisfactory productivity levels: 14.8 cars per worker in 1979, 21.5 in 1982. In addition, to manufacture the "Uno" more easily and at a lesser cost, Fiat spent the equivalent of 5 billion francs to modernize its plants. As a result, the cost price of the "Uno" is 20 percent lower than that of the "127" and it takes one third less time to manufacture it. With the "Uno," which complements an already substantial line, Fiat--which is practically getting out of the North American market and is experiencing difficulties in South America--is transferring all its efforts to the European market where, with a 13 percent penetration rate, it ranks right after Renault (14.5 percent).

It is uncompromisingly ambitious: "We intend to remain among the best," Mr Vittorio Ghidella, manager of Fiat Auto, stated.

For Peugeot, the "205" could be a decisive weapon for market reconquest and financial recovery. Peugeot did not make any sensational statement, but it is confident that it neglected nothing to make a best-seller out of the "205," to make up for the setbacks experienced by the "104" in competing with the Renault "5," and also to make inroads into the Renault "9" market. A mid-

range all-purpose model with 4 different 45-80 hp engines, the "205" could attract a wide range of buyers. Soon, it will also come with a 1,700 cc Diesel engine and sports versions will be offered. Some 12,000 units have already been manufactured so buyers will not have to wait. Already in March, production rates will be increased to over 400 units per day; they will reach close to 1,000 units per day later this year.

Like that of the "Uno," the introduction of the "205" was accompanied by a modernization of production tools at the Mulhouse plant, for which Peugeot spent 1.2 billion francs. Well equipped, the Alsatian plant is also the Peugeot plant with the most peaceful labor relations.

As far as the "205 effect" on competition is concerned, there is no doubt that the Renault "5" and "9" are Peugeot's primary targets.

Will Renault allow the "205" to compromise the position of its "R 5" which is still the leader in new car sales in France? Let us wait and see. However, in spite of the crisis, it appears that the automobile industry has never fought with so much spirit and imagination. Yet, it is not a case of total warfare since the two competitors of the hour, Fiat and Peugeot, are getting ready to produce jointly a small fuel-efficient engine to equip new and... competing models by 1985.

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CSO: 3698/201

TRANSPORTATION

PEUGEOT, RENAULT CONTINUE DEVELOPMENT OF CARS OF FUTURE

Paris L'ARGUS DE L'AUTOMOBILE in French 7 Oct 82 pp 4-5

[Articles: "Absent from Show: The Super Economical Vesta" and "Vera Plus: A New Research Program for Peugeot"]

[Excerpts] Renault Vesta



The big absence from the 1982 Salon is unquestionably the Vesta, Renault's "less-than-3-liters-per-100 km" car. [Trans. note: 3 l/100 km corresponds to over 60 mpg. It is the standard way to indicate fuel consumption in Europe.] Under this acronym--Advanced Systems and Technology Economical Vehicle [VESTA]--is hidden an advanced research project on a small vehicle that can transport four persons and their luggage while offering performance, comfort and safety identical to the levels currently attained. In short, the Renault 5 [marketed as Le Car in the United States] of the 1990's.

With 50 percent financing by the administration, the Vesta project began in the early months of 1981 along three broad research lines:

- economy from the motor standpoint;
- reduction of losses in [power] transmission;
- optimal aerodynamics.

At the moment, the exterior shape selected is that of a "mini" car 3.20 m long and 1.52 m wide. This "two-box" car will have a motor in a transversal position that drives the front wheels. For a while, a "one box" formula (absolute continuity of line from front to back) had been planned and then abandoned. Little lift coefficient was gained and design, weight balance and accessibility were complicated.

The projected consumption figures, with a gasoline motor, are extremely low: 2.28 l [per 100 km] at 90 km/hr, 3.64 liters at 120 km/hr and 3.05 liters city driving (ECE [expansion unknown] urban cycle 15). To achieve that, an extremely aerodynamic body was made. The model (our photograph) has 0.22  $C_L$  or, for moving prototypes, 0.25 to 0.26. However, it will be noted that the appearance, which is functional, is not very pretty and that the passengers have a rather small luggage trunk. After the semi-failure of the Eve project, the Renault technicians have begun on new bases, rather realistic ones this time, and on a group of problems that they already master very well. The most difficult thing will probably be to reach the upper weight limit set, 520 kg, but, after all, the use of the most sophisticated materials is not prohibited on prototypes and Renault already has tremendous experience thanks to the F 1!

As for the motor, it has not yet been clearly defined but we know that Renault is ready to build several Vestas to try out many solutions, including two cycle motors, gasoline and diesel. There will also be many transmissions, with mechanical [gear] boxes with 5 ratios and a continual variation transmission, the only point the Vesta shares with the Eve.

## Vera Plus: A New Research Program for Peugeot



Already Vera consumed only 3 liters of gas oil [over 60 mpg] at 90 km/hr 5 liters at 120 km/hr and 5.25 liters city driving. Vera Plus is going to do a lot better! It will be remembered that Vera was in fact a lightened (minus 185 kg) and more aerodynamic Peugeot 305 ( $C_L$ ; 0.305). Now, this latter value is today that of a production car, the Audi 100. They had to take it one step further. Vera Plus will, therefore, have a  $C_L$  of 0.22 all without any costly technology. The prototype seen at the Salon had an "ordinary" sheet metal platform, not streamlined, had side windows that were "non flush" because it uses a production stamp. In reality, thanks to a variable cooling air intake, the  $C_L$  is currently 0.18 but, accounting for the inevitable modifications during the elaboration of the definitive model, several points will be lost here and there. So it can now be said that the Vera Plus will definitely have a  $C_L$  of 0.22. The most interesting part of the matter is that the body is elegant, attractive and the design so successful that one forgets that the Vera Plus is a two-box [design]. We salute this exceptional achievement because it is the work of the Peugeot Style Center. Seeing so many Peugeots come from Pininfarina made us forget the tremendous talent of the teams of Gerard Welter (exterior styling) and Paul Bracq (interior styling) who designed and built the Vera Plus in record time.

The other basic research reflected by the Vera Plus is lightening of the frame. A simple method makes it possible to measure the recent progress in this field, that of the weight per usable square meter (passenger compartment plus trunk). While certain vehicles of comparable class (4 to 5 passengers) are around 250 kg/m<sup>2</sup>, Vera will reach 208 kg/m<sup>2</sup>. Weighing 750 kg, its weight is equal to that of sedans 3.5 m long, but it measures 4.19 m and offers elbow room of 137 and 136 cm (front, back).

Finally, the Vera Plus has a direct injection diesel, more economical than the indirect injection turbo diesel of the Vera 02 (10 to 15 percent). The 1360 cm<sup>2</sup> XY motor has also been abandoned in favor of work on the 1769 cm<sup>2</sup> XUD (Horizon and 305 Diesel), specifically on the noise level.

Encouraged by these preliminary results, the La Gareene technicians say that they will reach conventional [fuel] consumptions lower than or equal to 3 liters at 90 km/hr, 4 liters at 120 km/hr and 4.75 liters city driving (with a system comparable to the VW Start-Stop), exceptional performances for such a spacious sedan. And since they have already amply exceeded their projections for the Vera 01 and 02, we are awaiting what follows without worry--and with great interest.

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## TRANSPORTATION

### FRENCH AUTHORITIES DISAGREE ON FUTURE OF A 320

Paris LE MONDE in French 29 Jan 83 p 10

[Article: "Mr Fiterman's Optimism Clashes With General Mitterrand's Outlook"]

[Text] "While the Airbus program is, undeniably, not escaping the effects of the air transport crisis, it is faring rather better in the face of it than its competitors, and its situation in no way justifies the alarmist presentation that has been made in a LE MONDE article alleging an Airbus business slump." This was the comment of Mr Charles Fiterman, minister of state for transportation, following the publication in LE MONDE on 28 January of a letter from General Jacques Mitterrand, chief executive officer of SNIAS [National Industrial Aerospace Company], on Airbus's commercial situation which the letter termed "disturbing" and its balance sheet "negative" for 1982 and into 1984.

"Contrary to what is implied in this newspaper's report," Mr Fiterman explains, "I have not received the document referred to and was therefore not aware of it until now." This 21-page document, the existence of which was acknowledged by SNIAS, was addressed to several government authorities, and specifically, for the Ministry of Transportation, to Mr Guy Braibant, special assistant to Mr Fiterman, and to Mr Daniel Tenenbaum, director general of civil aviation in the Ministry of Transportation.

"Thousands of letters (...) circulate daily between enterprises, administrations and ministries, in which each party strives to advance his or her point of view in accordance with the perception each one has of his or her responsibilities," Mr Fiterman adds, "and it is absurd and dishonest to make a flashy display of this particular one, so that conclusions can be drawn from it having nothing whatever to do with the factual realities."

In this document, General Mitterrand affirmed: "Twenty-one planes must be sold to absorb production to the end of 1983," and "It is not at all beyond the realm of possibilities that certain contracts, considered sure today, could become doubtful in the weeks and months ahead if the situation of the airline companies continues to deteriorate." In a graph accompanying this comment, General Mitterrand showed that 41 Airbuses will have to be sold in 1984 and 78 Airbuses in 1985.

These are not easy undertakings, inasmuch as it is hardly easy, during a difficult period, to take steps without involving the long-term capacities of the aerospace industry.

The employment situation, if one sees it as does General Mitterrand, "should, theoretically, remain stable" with prospects tending toward a slight growth for the engine builders, and toward a slight drop for SNIAS, for example, which, however, can be absorbed by a rearrangement of working hours.

9399

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## TRANSPORTATION

### BRITISH LEYLAND REVEALS 'ENERGY CONSERVATION VEHICLE'

Paris L'USINE NOUVELLE in French 6 Jan 83 p 27

[Article by Daniel Coue and Pierre Laperrousaz: "Automotive: ECV 3, The British Car of the 90's"]

[Text] The latest from British Leyland is not only representative of the future: it also prefigures a considerable revolution in production methods.



If you want to get an idea of what the average car of the 1990's will be, take a look at the ECV 3 (Energy Conservation Vehicle), whose existence has just been revealed by British Leyland. Like its cousins Eve and Vera from Renault and PSA [Peugeot, Inc.] it is an experimental vehicle to test a coherent group of new concepts at full scale. And in this area the ECV 3 really has something else....

In a manner of speaking, since it only weighs 664 kg (full tank), compared to 845 for Eve and 740 for Vera, and only uses 3.5 l/100 km [about 58 mpg] at 90 km/hr. Its French counterparts didn't go below 4.2 l/100 km.

The secret of this efficiency? It is to be found first in an astonishing three cylinder gasoline engine made of a light alloy: a trick of the British motor manufacturers to improve the efficiency by raising the ratio of heat exchange surfaces to the volume of the chambers. This motor develops a power of 72 horsepower DIN [FRG standard] at 5,800 rpm for a capacity of 1,100 cm<sup>3</sup>, and the important thing is that it only weighs a little over 80 kg.

But it is in particular the "package" of the ECV 3 that needs to be examined. Starting with its C<sub>L</sub> (coefficient of penetration in air) of 0.22, an unprecedented performance (Eve's is 0.24), the result of a sleek profile and the elimination of any protrusions (of the cars currently on the market, the Audi 100, with a C<sub>L</sub> of 0.30, has the best profile). Except for the top of aluminum sheet metal, the body is almost completely built of fiberglass-reinforced plastic: polyester for the hood and the weight-bearing frame of the hatchback, polyurethane for the front and rear faces, the fenders, the door panels.

#### An Innovation: Gluing Assures the Solidity of the Unit

This plastic option contributes lightness and a freedom of design that promotes aerodynamics. Polyurethane does not have sufficient rigidity to constitute large self-supporting flat parts (hood, roof panel) but it has the advantage of absorbing shocks at low speeds without visible damages. It is molded by low pressure injection with tooling that is cheaper than for thermoplastic and polyester molding. On the other hand, the cycle times remain longer. By selecting polyurethane, British Leyland is betting on a favorable development of this material. The existence of an English polyurethane producer (IC [Imperial Chemical Industry]) is probably a factor.

Another important innovation: the body shell is made of metal (aluminum again), assembled by a combination of welding and gluing. It is in fact the gluing, done with single component "reinforced" epoxy adhesives, that assures the solidity of the unit. The essential purpose of the welding points is to retain the sheet metal in position while the glue sets, which takes place hot at the same time as the paint dries. This new method, which can be transposed outside the automotive industry, will considerably reduce manufacturing time and the energy expenditures required by welding. All of the automobile manufacturers are working assiduously on it. The ECV 3 is the first concrete example.

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## TRANSPORTATION

### BRITISH ROBOTS 'SNIFF' FOR LEAKS IN AUTO BODIES

Stockholm NY TEKNIK in Swedish 30 Sep 82 p 18

[Article by Sven-Olof Carlsson]

[Text] Industrial robots placed alongside the assembly line and moving their gas detectors over auto bodies can quickly detect small leaks in the vehicles--leaks which can cause irritating drafts and noise or admit water that soon causes rust damage to the automobile.

The traditional method of detecting those small leaks consists of spraying large quantities of water over the auto and having expert inspectors search for water that has gotten in.

That method is relatively cheap and sure. But it does not eliminate all kinds of leaks because water does not get in through all the openings.

British Leyland's Austin-Rover plant in Oxford now has two Norwegian Trallfa robots alongside the assembly line to inspect all the auto bodies as they pass by. The autos pass the robots at the normal assembly-line speed. But the robots nevertheless have time to sweep over the entire surface of each auto (a total distance of about 60 meters).

#### Helium

The method consists of pumping air mixed with helium into the interior of the auto and checking to see where the gas escapes and how much escapes at each location.

Each of the two industrial robots--one on each side of the assembly line--moves its gas detector over its half of the auto's surface.

The robots start their inspection by sweeping over the edges of the windshield and then following a precisely programmed pattern that checks every seam where leaks might occur.

The robots also have time to stop at certain calibration points to check their position in relation to the auto.

Such calibration is important because each leak must be plotted on a drawing of the auto. That precisely dimensioned drawing is then used in making the necessary readjustments to close the leaks.

#### Air Seal

The auto plant in Oxford had to come up with a new system for suspending the auto bodies so that they would pass the robot inspectors within a tolerance of 1.5 mm.

Technicians at the Austin Rover plant themselves developed a now-patented "sniffer" to ensure the correct precision and fine sensitivity during inspections for leaks. The gas detector, located at the tip of the robot arm, is equipped with a slight air seal that prevents the gas from escaping along the body surfaces and confusing the detector.

The robot moves the gas detector less than 2.5 mm from the body surfaces at speeds of up to 300 mm per second. At that speed, it is able to record up to 400 leaks. For each leak, it records the location and intensity of the leakage.

The Austin-Rover plant currently uses the sniffing robots to inspect the assembly of the Triumph Acclaim, whose closest Swedish equivalent is the Honda Accord.

The Acclaim is the first example of automaking cooperation between the British and Japanese auto industries.

#### Better Reputation

The British auto industry has long had a reputation for being less precise in the assembly of its automobiles than automakers in other countries. With the new method of checking for leaks, British Leyland now hopes to manufacture automobiles that will earn the reputation of being more impermeable than others.

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## TRANSPORTATION

### RENAULT, VW TO JOINTLY MANUFACTURE AUTOMATIC TRANSMISSIONS

Paris AUTO-INDUSTRIES in French 13 Jan 83 pp 1-2

[Article: "Renault-Volkswagen Agreement To Manufacture Automatic Transmissions"]

[Text] Paris, 12 January (French News Agency)--On 12 January in Paris, Renault and Volkswagen signed an agreement under which, starting in 1985, they will jointly manufacture a new automatic transmission for vehicles with 1,400-2,600 cc engines.

The agreement, which had been announced in December 1980 and whose term has been set at eight years, was initialed by Messrs Gunter Hartwich, in charge of Volkswagen's international production, and Pierre Tiberghien, automobile director at Renault.

The two companies will cooperate in manufacturing this transmission: Renault will make the converters and the electronic components--which were developed by its Renix subsidiary--and Volkswagen the mechanical components.

Volkswagen will produce 1,000 transmissions per day and Renault 600. By co-operating, the two manufacturers will be able to reduce by 20 percent the development and investment costs of the transmission; its cost price will also be reduced by 10 percent since series will be larger.

Component exchanges will involve a total amount of approximately 900 million deutschemarks (2.55 billion French francs). To manufacture this transmission, Volkswagen will invest 200 million deutschemarks (566 billion francs) in its Kassel plant, and Renault 300 million francs.

The transmissions will be assembled by the two partners in their own plants: in Kassel by Volkswagen and in Ruitz (Pas-de-Calais) by Renault; the latter will still continue to manufacture its present automatic transmission (575 units per day at present).

The joint transmission will have four gears, the fourth with a very high reduction ratio. Two versions will be manufactured: a longitudinal and a transversal version. The third and fourth gears will operate without slipping, and two converters will ensure appreciable fuel savings.

The joint transmission will be installed in approximately half the cars of both brands exported to the United States. At present, 5-8 percent of Volkswagen's models are equipped with an automatic transmission, and 4-5 percent of these are sold on the European market. However, since the new automatic transmission will be more fuel efficient, the two companies believe that it will be used on 10 percent of their output a few years from now.

Renault and Volkswagen do not exclude the possibility that they may cooperate on other mechanical components in the future. "We are quite willing to cooperate in the same manner for other components, should economic conditions warrant it," Mr Tiberghien stated on 12 January

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## TRANSPORTATION

### DIAMLER BENZ 'AUTO 2000' IS TOURING CAR

Duesseldorf VDI NACHRICHTEN in German 15 Oct 83 p 29

[Article by Olaf von Fersen: "The Car of Tomorrow. Mercedes 2000 Offers Great Comfort and High Performance"]

[Text] With its experimental car, the Daimler-Benz Firm has, in its own words, created a "carrier of a new idea", which, despite its partially futuristic experimental design, is in no way just a marvelous car. Along with the three different drive proposals--supercharged V-6 diesel engine, V-8 spark ignition engine with cylinder-switching, and gas turbine--the Mercedes 2000 has an automatic four-speed transmission with three electronically-controlled driving programs, improved passive safety as well as electrical components that take the burden off of the driver.

From time immemorial, large ships, such as battleships, armored cruisers, and the like, have been called "the big pots" in the navy. Among the experimental cars presented as appetizers at the last IAA convention at the Airport Hotel in Frankfurt, the Daimler-Benz model looked like the Admiral's flagship in a naval review. Although the experimental Daimler has practically the same dimensions as the S-class model, it gives the impression of being almost gigantic, because of its modest height in a closed space.

If, contrary to the present-day "think-small-trend", the experimental auto were given a dimensionally anti-cyclical character in Unterukheim, that would form the basis in the future of the firm's keeping an important place in the upper classes, whose buyers overwhelmingly use cars to cover long distances for business purposes, with occupancy per auto higher than the average of around 1.6 persons. Therefore, the offer of a large-scale interior and comfort, plenty of luggage room, and above-average performance would have priority. It was necessary to combine these demands with improved economy and also improve the environmental and safety standards to a level above the present-day norms.

The tight schedule set by the Federal Ministry for Research and Technology (BMFT) in its call for bidding has also compelled the keeping of the project within certain limits. Above all, that meant building from available designs where possible and including previously started

experimental projects. From among the latter, the automotive gas turbine presented itself. Daimler-Benz has already been closely involved with these for a number of years. Eight-cylinder piston engines, spark-ignition engines with cylinder shut-off and antechamber diesels were considered alternatives for the experimental auto. The reduction of promotion then compelled Daimler-Benz to confine the project and the spark-ignition engine was "set aside" for the present. The diesel engine also underwent a change from a V-8 to V-6. This essentially more compact power plant offers better possibilities for more efficient sound proofing and agreeable fuel consumption. The motor has a 90° fork-angle for the engine block, made of light metal with grey cast-iron bushings. Also made from light metal are the cylinder heads, in each of which a camshaft actuates the valves over the piston with automatic equalization. For the combustion chamber, the Daimler-Benz antechamber-principle has been retained. This principle is credited with a softer combustion and a less critical smoke content under direct fuel injection.

Diesel engine operates with two turbo-chargers

The series injection pump, placed between the cylinder rows, is powered jointly with camshaft by a double roller chain. Charging is required to bring the 3.3-liter to the desired level of performance. A new system was developed for this. The system makes use of two small turbo-chargers made by KKK (Kuhnle, Kopp & Kausch), which act according to the register principle. Up to a speed of  $2400 \text{ min}^{-1}$ , only one charger is in operation and the other remains out of operation behind a control valve. A second valve prevents the back-flow of the condensed air charge to the air-face. An electronic regulator controls both valves. This construction of two small chargers and register function also provides prompt acceleration of the condensor at low rpm's and thus improves motor response. This means that a quick rise in rotation moment is prompted and the motor's reaction time is decreased.

The auxiliary assembly drive by a poly-V-belt and two-speed planetary gear in the crankshaft drive pulley is also novel. The crankshaft provides sufficiently-high rpm's to the auxiliary assembly at low engine rpm's. Use of a single poly-V-belt considerably saves overall length: instead of several V-belts running off of one another, just one longer belt does the work. The crankshaft exceeds an rpm of  $1500 \text{ min}^{-1}$  and switches the planetary gear to a higher level--the same speed for motor and auxiliary assembly.

Since 1960, when the British firm Rover presented the first functional gas-turbine automobile and then proved in 24-hour racing at Le Mans in the 1960's that such a car can compete with its piston-engine rivals with respect to performance, a short-lived euphoria over gas-turbines occurred in the automobile world. Many engineers becoming quite serious then believed that the trend would last for ten years at the most, culminating in a series of turbine-powered automobiles. The difficulties, however, proved to be substantially greater than expected and almost all of the big car producers who had become more or less highly involved in

turbine development dropped their high-flying plans again. All except for Daimler-Benz. In Unterturkheim, a more realistic approach was taken to the gas turbine, perhaps also because of their experience with aircraft engines. Substantially longer periods of development were taken into consideration, but research was never reckoned with, however, research was never completely stopped.

When the announcement by BMFT [Federal Ministry for Research and Technology] reached Daimler-Benz, gas-turbine development was so far advanced that such a power plant was being foreseen for the experimental car. Plans for the Mercedes experimental car already envisage two stages of development for the turbine. The main difference between the stages I and II consists in the fact that the earlier version, with ceramic components operating under considerably higher temperatures, should provide greater economy despite a higher level of performance. A performance of 94 kW at an exhaust rpm of  $6500 \text{ min}^{-1}$  is mentioned for the Model I turbine, while 110 kW at  $5000 \text{ min}^{-1}$  is expected from Model II. Its maximum torque is also substantially higher with 550 Nm as opposed to 332 Nm. The weight of both of these models is 240 kg each.

Compact gas turbine turns out 94 kW power

The design of this engine is a matter of a two-wave turbine in which the condenser (gas generator) and drive are each equipped with their own working turbine.

Each such gas turbine consists of four main components: gas generator, combustion chamber, a heat exchanger between these and the drive section with the working turbine and the reduction gear, which lowers the rotation of the working turbine to a ratio of around 10:1.

The entire unit is rather compact. The shafts of both turbines lie in the vehicle's longitudinal axis. The combustion chamber is slanted  $57^\circ$  sideways on the left side of the vehicle. The condenser-shaft drives the auxillary unit as well as the slowly rotating heat exchanger over the turbine. The heat exchanger is powered by a vertical shaft from the condenser. The condenser's pulley, drawn through narrow channels, is made of aluminum silicate.

The turbine-impellers require a material that is highly heat-resistant. For this reason, Daimler-Benz's engineers selected silicon nitride, which is not-pressed, and then worked at great expense. Stationary parts exposed to the turbine's operating temperatures are made from ceramic or from highly heat-resistant metal alloys. In its present form, the gas turbine already offers some advantages over the piston engine, such as multi-fuel capability, good torque development, sharply-reduced emissions of harmful substances in the exhaust, minimal wear, low maintenance demands, and the ability to provide full performance immediately after cold-starting. In full load operating conditions, the gas turbine is a match in economy for the spark-ignition engine, but in

partial load operation, it is slightly less satisfactory. The gas-turbine should be in a position to offer competition to spark-ignition and diesel motors. According to Dr. Hans-Joachim Forster, Daimler-Benz Research Director, this engine "must be better than the piston engine in all respects".

Power transmission to all of parts planned for the experimental car is provided by an automatic transmission with four forward speeds and electronic control. The electronic control device offers three programmed driving modes which can be set by a push-button switch next to the gear-shift in the center console: "economy-city-fast". The "economy" mode intervenes in the injection pump and gears to limit performance and high speed, "city" mode induces early gear engagement and the "fast" mode brings the entire engine performance into play.

The chassis and suspension are presently identical with others of this car class, but lighter materials will be used where possible to lower the weight of the experimental car. Parts of the steering mechanism and the wheels themselves are made of light metals and the one-piece drive crankshaft is made of carbon-fiber reinforced synthetic material. The spare-tire compartment will hold a light spare-tire. The hydro-pneumatic suspension is the same one that is offered as an optional feature for S-class cars. The telescopic forks are presently made of aluminum and the brake assemblies include an automatic lock-up prevention device. An electronic forward-thrust control is new. This prevents wheel-spin under acceleration.

#### Kamm-Hech brought aerodynamic advantages

In developing the body-work for the experimental car, the important areas were close to the standard concerns such as more comfort, less weight, and better aerodynamics. The areas of passive safety and new heating and air-conditioning techniques are advanced. Since the front of the car has been only slightly reduced in size by lowering the roof, the aerodynamic qualities had to be improved by a number of small refinements so that a wind-resistance value ( $c_w$ ) below 0.3 could be obtained. Advantages were presented above all by the Kamm-Hech, the form of the car (grill), the lining of the bottom of the car, flush side windows and good cooling air conveyance. The front fenders, hood and bumper are made from fiber-reinforced polyurethane. In the interest of pedestrian safety, the experimental car's hood will bend under shock. The double-shell construction doors are made from aluminum sheet-metal, as are the wheel-rims, which reduces their weight by 50%, as compared to mass-produced steel rims, without sacrificing strength. With the exception of the "Securiflex" front windowshield, all windows are made from light acrylic glass. They are, of course, glued into their frames and cannot be pushed through. For instances where "conversation with the outside world" is necessary, the front door windows are provided with small hinged insets.

Heating system uses heat pipes.

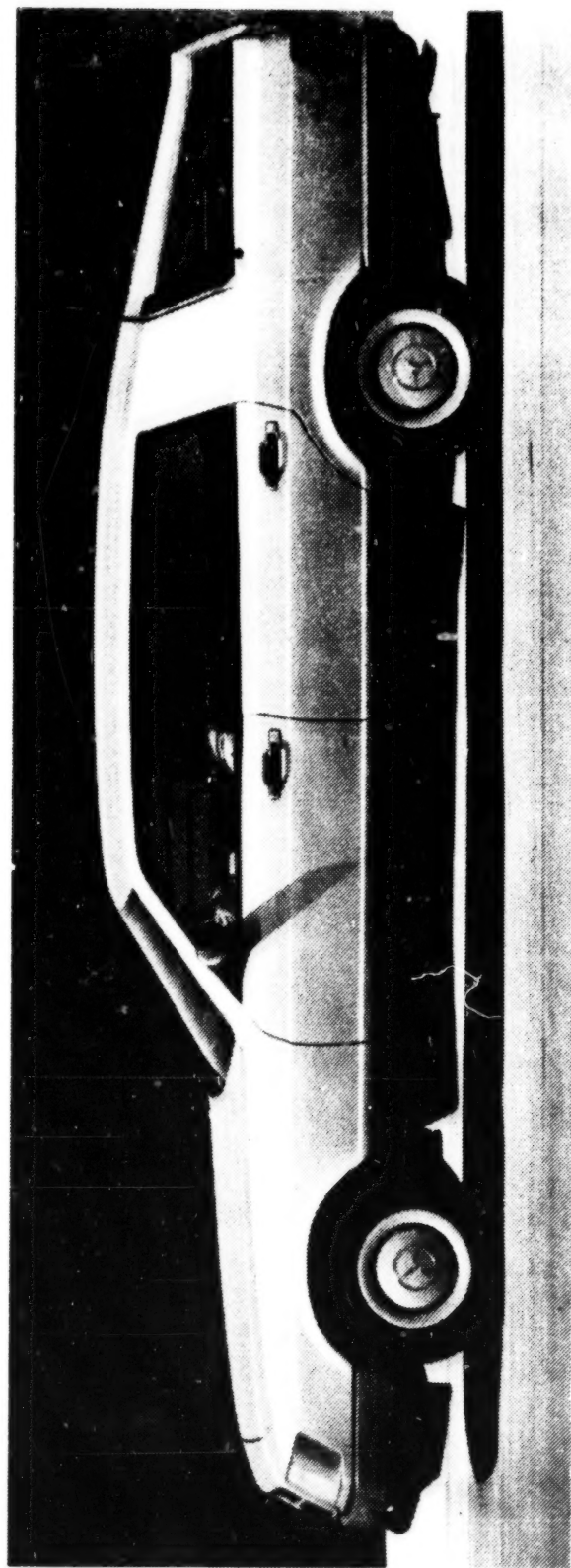
Instead of the usual hot-water radiator, the experimental car will make use of heat-pipes, already known from electronic parts cooling. The light and compact heat-exchange can both transfer engine heat from the cooling water to air-heating, as well as air heat to the air-conditioning system's coolant. A separate heat-exchanger for the air-cooling and heating system is not needed.

For improvement of passive safety, a principle was realized, thanks to ongoing accident studies. These studies determined that the left (driver's) side is most affected in frontal collisions. Thus, the experimental car's body-work and the frontal structure of the left side were reinforced and the hood was fastened on that side. Further precautions were an improved active support system with three seat-belts and straps as well as an airbag in the steering wheel.

The dashboard instrumentation uses liquid-crystal technology. In order to avoid unnecessarily distracting the driver, only vehicle speed, fuel level, time and mileage are displayed. When needed, other information can be obtained: with the push of a button, rpm's, oil pressure and radiator temperature appear in the display.

The Mercedes-Benz 2000, like other experimental cars, offers an expensive computing unit. It consists of calculators for maintenance (maintenance intervals), inspection (functional disturbances), travel (mileage, fuel consumption, range), routes (presently an electronic atlas for the West German Autobahn network) combined with a communication system. The communication system should make it possible to conduct conversations over the public telephone system, call for help, and receive traffic information. The system pre-supposes that the road systems will eventually include permanent fixed sending and receiving stations.

Low wind-resistance, high degree of safety and light construction characterize the body-work of the Daimler-Benz experimental car Auto 2000. The car's  $c_w$ -value is less than 0.3. Alternative power plants for the comfortable touring car are a supercharged 3.3-liter diesel engine, 3.8-liter V-8 spark-ignition engine with cylinder shut-off (110 kW performance), as well as an option for the distant future-gas turbine from which a power output of 94 kW is expected.



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